

component is bonded to the circuit board.

30. An electronic component mounting method as claimed in any one of claims 25 through 29, wherein the gold bump that has an approximately conically shaped tip is 5 formed on the electrode of the electronic component by means of the capillary that has a chamfer angle ( $\theta_c$ ) of not greater than  $100^\circ$  when a gold ball (96a) is formed by an electric spark at a tip of a gold wire (95) similarly to the wire bonding in forming the bump on the electronic 10 component and a tip shape provided with no flat portion to be brought in contact with the gold ball.

31. An electronic component mounting method comprising:

15 forming a ball (96, 96a) at a tip of a metal wire (95) by an electric spark similarly to wire bonding and forming a bump (3, 103) on an electrode (2) of an electronic component (1) by means of a capillary (93, 193) by the formed ball;

20 mounting the electronic component on a circuit board (4) while aligning in position the electrode of the electronic component with an electrode (5) of the board with interposition of a solid or semi-solid insulating resin layer (6, 306b) in which an insulating resin (306m) is mixed with an inorganic filler (6f) without leveling the 25 formed bump;

subsequently hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board with a pressure P1 applied as a pressure force to the electronic component 5 against the circuit board and heat applied from an upper surface of the electronic component by means of a tool (8) heated to a specified temperature; and

subsequently bonding the electronic component to the circuit board while alleviating a stress caused when 10 hardening the insulating resin by reducing the pressure force to a pressure P2 lower than the pressure P1 after a lapse of a specified time, so that the electrode of the electronic component is electrically connected with the electrode of the circuit board.

15 32. An electronic component mounting method as claimed in claim 31, wherein the pressure P1 is not smaller than 20 gf per bump, and the pressure P2 is not greater than one-half the pressure P1.

20 33. An electronic component mounting apparatus comprising:

a device (7, 109, 200, 201) for sticking a solid or semi-solid insulating resin layer (6, 306b), in which an insulating resin (306m) is mixed with an inorganic filler (6f), to an electrode (5) of a circuit board (4) or an 25 electronic component (1);

a device (93, 193) for forming a bump (3, 103), without leveling, by forming a ball (96, 96a) by an electric spark at a tip of a metal wire (95) on an electrode (2) of the electronic component (1) similarly to 5 wire bonding and forming by thermocompression-bonding this to the electrode of the board with supersonic waves by means of a capillary (93, 193);

a device (600) for mounting the electronic component on the electrode (5) of the circuit board (4) through positional alignment; and

a device (8, 9) for bonding the electronic component to the circuit board by hardening the insulating resin interposed between the electronic component and the circuit board while correcting warp of the board with a pressure force of not smaller than 20 gf per bump applied to the electronic component against the circuit board with heating by means of the tool (8), electrically connecting the electrode of the electronic component with the electrode of the circuit board.

20 34. An electronic component mounting apparatus comprising:

a device (7, 109, 200, 201) for sticking a solid or semi-solid insulating resin layer (6, 306b), in which an insulating resin (306m) is mixed with an inorganic filler (6f), to an electrode (5) of a circuit board (4) or an